

No.	B.D.	R.A. 1900. h m	Decl. ° ' "	P.	D.	Mags.	Date.	Nights.
298	39, 2242	9 19'4 + 39 2	169°9 37'1 0.01	0.11	0.06	11.17	2	CD
			318.9 92.17	...	...	06.17	2	AC
299	35, 2017	25.8 34 56	217.1 4.78 11.2 11.5	06.26	06.26	2	BC	
			360.0 55.87 A =	9.0	06.26	2	AB	
300	35, 2021	27.6 35 36	142.4 2.04	9.2 10.3	06.27	2		
301	40, 2245	36.5 40 45	236.4 4.23	8.7 10.7	06.19	2		
302	37, 2077	10 20.6 36 58	348.4 2.63	9.2 10.7	06.17	2		
303	31, 2212	53.3 31 10	201.4 7.56	9.0 11.0	06.29	2		
304	39, 2399	55.0 39 1	89.1 5.65	9.2 10.5	06.19	2		
305	35, 2230	11 12.0 35 1	31.8 383	9.1 9.5	06.26	3		
306	39, 2458	33.0 39 18	341.0 6.76	8.0 11.2	06.25	2		
307	39, 2491	12 0.1 39 24	358.7 4.74	8.0 13.3	06.29	4		
308	32, 2343	13 16.5 32 30	292.2 7.06	9.1 9.1	06.28	3		
309	32, 2381	39.9 32 4	133.9 1.88	9.2 9.5	06.29	3		
310	32, 2382	40.2 31 57	nf 5 ±	9.2 11.0	06.27	1		
311	35, 2619	14 50.2 + 34 52	288.5 3.76	8.8 9.3	06.28	2		

*Notes.*

271. This star was looked at again on February 9, but the condition of the air was then unsteady, and the star was not seen double.

278. A fine object, which so far has escaped detection.

282. This pair was found while measuring S 483. It is 187" distant from B of S 483 at an angle of 30°9.

289, 290. Angles discordant.

296. A difficult object found while measuring h 2483.

303. Found while measuring Σ 1492, rej. 1m 10f.

307. Found while looking for the missing pair h 2595. The *comes* is extremely difficult, and can only be seen by oblique vision.

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*Elements of Five Long-period Variable Stars.*

By A. Stanley-Williams.

As the under-mentioned five long-period variable stars have now been under observation for several years, it seems desirable to bring together the results and to derive from them fresh and more exact elements of variation. Excepting where otherwise mentioned the dates of the different maxima and minima have been derived from observations made at Hove. Some further particulars of most of these have been published in the *Astronomische Nachrichten* or the *Astronomical Journal*. With the exception of RU Persei the minima of all the stars are too faint for observation with a 6½-inch telescope. Z Lyrae, however, does not descend much below the *minimum visible* for this aperture.

*Z Lyrae* (Ch. 6816).R.A. =  $18^{\text{h}} 55^{\text{m}} 59^{\text{s}}$ , Decl. =  $+34^{\circ} 48' 9$  (1900).

Maxima of this star have been observed as under :

E.	Date.	J.D. <sub>241</sub> <sup>+</sup>	Computed Maximum.	O-C. d	Mag.
-1	1899 Nov. 21 ±	4980 ±	4976·3	+3·7	...
0	1900 Sept. 2	5265	5267·3	-2·3	...
+1	1901 June 20*	5556	5558·3	-2·3	...
1	1901 July 1	5567	5558·3	+8·7	9·4
2	1902 Apr. 7 ±	5847 ±	5849·3	-2·3	...
4	1903 Nov. 10	6429	6431·3	-2·3	9·6
5	1904 Aug. 30	6723	6722·3	+0·7	9·3
6	1905 June 17	7014	7013·3	+0·7	9·9

and from these the following elements have been derived :

$$\text{Maximum} = \left\{ \begin{array}{l} 1900 \text{ Sept. } 4\cdot3 \\ \text{J.D. } 2415267\cdot3 \end{array} \right\} + 291^{\text{d}}\cdot0 \text{ E.}$$

The computed times of maximum and the residuals O-C are given in the fourth and fifth columns of the above table. It should be mentioned that there is a faint star ( $12\frac{1}{2}$  mag.) about  $12''$  n.f. the variable, and easily mistaken for the latter when faint. The minimum brightness of *Z Lyrae* is probably about 14th magnitude.

*RU Lyrae* (Ch. 6895).R.A. =  $19^{\text{h}} 9^{\text{m}} 6^{\text{s}}$ , Decl. =  $+41^{\circ} 8' 1$  (1900).*Observed Maxima.*

E.	Date.	J.D. <sub>241</sub> <sup>+</sup>	Computed Maximum.	O-C. d	Mag.
2	1902 Aug. 21	5983	5987·2	-4·2	9·9
3	1903 Sept. 5	6363	6355·4	+7·6	9·4
4	1904 Aug. 28	6721	6723·6	-2·6	10·9
5	1905 Sept. 2	7091	7091·8	-0·8	10·2

The elements of variation are :

$$\text{Maximum} = \left\{ \begin{array}{l} 1900 \text{ May } 10\cdot8 \\ \text{J.D. } 2415250\cdot8 \end{array} \right\} + 368^{\text{d}}\cdot2 \text{ E.}$$

\* Observed by Hartwig at Bamberg (*A. N.* 3744, col. 370).

*TY Cygni (Ch. 7019).*R.A. =  $19^{\text{h}} 29^{\text{m}} 51^{\text{s}}$ , Decl. =  $+28^{\circ} 6' 2$  (1900).*Observed Maxima.*

E.	Date.	J.D. $_{241+}$	Computed Maximum.	0-0.	Mag.
0	1900 Nov. 22 ±	5346 ±	5342·0	+ 4·2	...
1	1901 Nov. 11	5700	6995·8	+ 4·2	9·2
2	1902 Oct. 27	6050	6049·6	+ 0·4	8·85
3	1903 Oct. 7	6395	6403·4	- 8·4	8·7
4	1904 Oct. 10	6764	6757·2	+ 6·8	9·1
5	1905 Sept. 19	7108	7111·0	- 3·0	8·6

The following elements of variation have been derived from the foregoing maxima :

$$\text{Maximum} = \left\{ \begin{array}{l} 1900 \text{ Nov. } 18 \\ \text{J.D. } 2415342 \end{array} \right\} + 353^{d.8} \text{ E},$$

and these elements accord with the invisibility of the star on a photograph taken by Professor Max Wolf at Heidelberg on the nights of 1891 September 25-30 (total exposure 12 hours), as it should then have been near minimum brightness. The variable remains below 12th magnitude for nearly half the time.

*TW Cygni (Ch. 7571a).*R.A. =  $21^{\text{h}} 1^{\text{m}} 45^{\text{s}}$ , Decl. =  $+29^{\circ} 0' 3$  (1900).*Observed Maxima.*

E.	Date.	J.D. $_{241+}$	Computed Maximum.	0-0.	Mag.
-1	1899 Oct. 7 ±	4935 ±	4949·2	- 14·2	...
+1	1901 Sept. 1	5629	5633·4	- 4·4	8·8
2	1902 Aug. 15	5977	5975·5	+ 1·5	9·6
3	1903 Aug. 3	6330	6317·6	+ 12·4	9·0
4	1904 June 28	6660	6659·7	+ 0·3	9·2
5	1905 May 26	6992	7001·8	- 9·8	9·0

The elements of variation are :

$$\text{Maximum} = \left\{ \begin{array}{l} 1900 \text{ Sept. } 28·3 \\ \text{J.D. } 2415291·3 \end{array} \right\} + 342^{d.1} \text{ E.}$$

The residuals in the fifth column indicate that the period is subject to a somewhat large irregularity, doubtless of a periodic character, though the observations do not yet extend over a sufficiently long interval of time to enable any accurate value of it to be derived.

## RU Persei.

R.A. =  $3^{\text{h}} 23^{\text{m}} 57^{\text{s}}$ , Decl. =  $+39^{\circ} 18' 9''$  (1900).

## Observed Maxima.

E.	Date.	J.D. <sub>241</sub> <sup>+</sup>	Computed Maximum.	O-O.	Mag.
0	1904 Nov. 28	6813	6814.0	-1.0	9.7
2	1905 Nov. 26	7176	7175.4	+0.6	9.4

## Observed Minima.

		Computed Minimum.		
0	1904 Sept. 19	6743	6743.0	0.0
2	1905 Sept. 17	7106	7104.4	+1.6
3	1906 Mar. 14	7284	7285.1	-1.1

The adopted elements of variation derived from the above maxima and minima are :

$$\text{Maximum} = \left\{ \begin{array}{l} 1904 \text{ Nov. 29} \\ \text{J.D. } 2416814 \end{array} \right\} + 180^{\text{d}}.7 \text{ E},$$

the interval  $M-m$  being 71 days. The magnitude of the variable at maximum is 9.4-9.7; and at minimum it is 10.4-10.7.

Owing to the small range of variation, and to the fact that both the maximum and minimum brightness vary somewhat, I have not attempted to correct the above elements by means of the photographic observations published in the *A. N.* 3675. For the same reason the early B.D. observations published by Professor Küstner in the *A. N.* 3989 are not at present available for this purpose. Dr. E. Hartwig observed the star equal to B.D.  $+39^{\circ} 803$  (9.5 mag.) on 1905 October 20 (*A. N.* 4061). According to the observations made here it attained to equality with that star on 1905 October 19.

20 Hove Park Villas, Hove:  
1906 May 1.

Observations of Jupiter in 1903 and 1905-6.  
By W. F. Denning.

In *Monthly Notices*, lxiii, 331-4 (1903 April), I gave a summary of rotation periods of markings on Jupiter from observations at Bristol during the years 1898 to 1902 inclusive.

In continuation of these results I give the following table for the opposition of 1903 :—1388 transits were taken and 1188 of these were utilised in the determination of rotation periods: